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VALUE IN ITS RELATION TO INTEREST.

I.

THE explanation of interest has been sought in the increase of aggregate value¹ rather than in the increase of commodities or utilities. For instance, Böhm-Bawerk: “. . . what people look to in economic life is the value of goods To obtain the basis for the principal part of our work—the explanation of interest—we require to go into the theory of value.”² Hugo Bilgram says: “. . . it will be necessary to give a brief outline of the theory of value, in which Professor Böhm-Bawerk rightly seeks the law of interest.”³ Let us see whether a simple illustration will not identify the increase of commodities as the real fountain of interest.

If we accept, in this discussion, the ordinary conception of value, namely price,⁴ it can be shown that an increase of aggregate value in the individual product is by no means indispensable to a surplus that may be appropriated to interest. An increase of output, although attended with a decrease in aggregate value, will provide for the payment of interest. To illustrate, let us consider four types of industries, A, B, C, D, all operated without capital, and suppose the yearly product of

¹ As appropriate in a discussion of the interest question, “value” in this paper is confined to the general sense of exchange value, or what Böhm-Bawerk describes, preliminary to his formal treatment of interest, as “objective exchange value.” The exchange relation of commodities to the money standard as well as to other commodities is meant to be covered in this extended sense of the term.

² *Positive Theory of Capital*, p. 125.

³ *Quarterly Journal of Economics*, January 1892, p. 191.

⁴ Capital is borrowed in terms of money, and the returns must be made in the same standard, both principal and interest. It matters not whether money appreciates or depreciates during the term of the loan. It is the nominal sum, and in addition the stipulated interest, say 5 per cent., that must be paid. If the standard appreciates, the 5 per cent. is nevertheless exacted. If depreciation takes place, no more than the stipulated rate of interest will be paid. It is easy to see, therefore, that questions of interest, not of the philosophy of interest, but of the amount of interest in any specific case, find expression in terms of money value.

each commodity is one thousand units.¹ Suppose, for simplicity, that this yearly product has the value of \$1000 in each case, also that we have but four operatives to deal with, one for each industry, and that the aggregate product is consumed yearly, the commodities exchanging against one another, unit for unit, each man consuming 250 units each of the four types of commodities, leaving no accumulation for capital. Eventually one of the men conceives the notion that \$1000 of capital will enable him to increase his output manyfold. He borrows the \$1000, or what is equivalent to 1000 A, and let us suppose as the result at the end of the year that his product has been 4000 instead of 1000 A. Böhm-Bawerk² emphasizes the claim that so far as the productive relation goes it cannot be shown that the increase of value (money value, of course), due to the employment of capital, is in excess of the value of the capital destroyed in the process, and he expects it to be taken for granted that an excess of this value is indispensable to interest. In the case we are considering the aim will be to show that the increase of *commodities*, independently of increase of total *value*, provides for interest.

Let us suppose, then, that the 4000 A has the value of \$2000. This will allow for 2000 A to replace the \$1000 capital borrowed, and leave 2000 A to the borrower, which share, on the basis of 4000 A at \$2000, has a value equal to that of his former product of 1000 A.

At first sight, it appears that interest is entirely excluded by this result; but let us examine the situation further. Suppose the capitalist is a consumer of A, B, C, D, and that he elects to take the 2000 A in lieu of the value \$1000. At the present value of A, he must give 1500 units of that commodity for 250 each of B, C, D, that is, 2 for 1 of each of the latter. This leaves him 500 A, whereas formerly, when 1000 A had the value of \$1000, he could have retained but 250 A. To be sure, the 500 A, expressed in terms of the standard, has a value equal

¹ That is to say, without borrowed capital, and with only primitive instruments, simple tools, too insignificant to figure in a problem of interest.

² *Positive Theory of Capital*, p. 122.

only to the former value of 250 A; but, as a consumer, he has a surplus of 250 A, which may be considered as interest indeed, although it does not figure as *nominal* interest.

So far, we have not arrived at interest in the ordinary sense, that is, a surplus of money value to the lender; but the search is not exhausted. The borrower also is possessed of 2000 A. To be as well off as in former years, he must have 250 of each of the four types of commodity. As in the case of the capitalist, 1500 A will secure him 250 each of B, C, D, leaving him 500 A, or a surplus of 250 A. This surplus may be applied to the payment of interest, showing that interest may be paid regardless of any excess of value expressed in terms of money. Indeed, a slight decline in this aggregate value is not incompatible with the payment of interest, while still leaving the borrower as well off as formerly.

Suppose that a unit of A has declined to $\frac{10}{21}$ its former value, or to a little less than $\frac{1}{2}$. On this supposition it will take 2100 A to replace the \$1000 borrowed, since $\frac{10}{21}$ of 2100 = 1000. This leaves to the borrower 1900 A, which has a value of $\frac{10}{21}$ of \$1900, or about \$905, showing a decrease in aggregate value of \$95. How does this affect the condition of the borrower? As before, he exchanges A for B, C, D, but this time at the rate of 21 for 10. For 250 each of B, C, D, at this rate, it will take 1575 A, since $\frac{10}{21}$ of 1575 = 750. This leaves him the difference between 1900 A and 1575 A, or 325 A, showing a surplus of 75 A, which surplus may be applied to interest.⁶

⁶In this example, A's product could show a decline in value of \$133.33 $\frac{1}{3}$ before reaching the point at which interest must cease, or the borrower suffer a disadvantage. At this point the unit money value of the commodity is $\frac{7}{15}$ its former value. On this supposition 2142 $\frac{6}{7}$ A will restore the borrowed capital, since $\frac{7}{15}$ of 2142 $\frac{6}{7}$ = 1000. 1607 $\frac{1}{2}$ A will secure 250 each of B, C, D, as $\frac{7}{15}$ of 1607 $\frac{1}{2}$ = 750. Finally A will have left 4000 — (2142 $\frac{6}{7}$ + 1607 $\frac{1}{2}$), or 250 of his own commodity. This ratio, $\frac{7}{15}$, is obtained as follows:

First deduct 250, to be retained by A, from 4000 A, and the remainder, 3750 A, must make good the borrowed capital and purchase 250 units each of B, C, D. These items have a value equal to \$1750. If we let x = the ratio sought, 3750 x = \$1750, or x = $\frac{7}{15}$.

Even at this decline of total value, amounting to \$133.33 $\frac{1}{3}$, the community, including the capitalist, is better off than before, since the latter commands a surplus of 285 $\frac{5}{7}$ A, and B, C, D each has the same surplus of A, owing to the rate of exchange of A against B, C, D, 7 to 15.

The example proves that increase of commodities, rather than increase of aggregate money value must account for interest.

It is proposed now to show that increase of aggregate value, in its true significance, must normally accompany increase of commodities, or utilities, so that increase of the former is tantamount to affirming increase of the latter; and that while to attribute interest to the increase of value, in this sense, is justifiable, it is more logical to go at once to the foundation of both value and interest, namely, increase of utilities, for the principle we are seeking.

In the example cited, suppose that A had been the standard of value, what would the effect have been on aggregate values? Let the case stand as before, with regard to the relative unit values of the various commodities. A being the standard, the values or prices, of B, C, D would have doubled, making an increase of total value in terms of A, of 100 per cent. Why should not A be taken as the standard as well as a piece of coin? If, under the circumstances B, C, or D had been the standard, the case would have stood as originally, when money was used as the standard, since B, C, and D, remained stationary, expressed in terms of coin. But suppose B, C, and D had resorted to capital with the same result as A. The outcome would have been no increase of aggregate value, measured in the usual standard of money, but vast increase in real welfare and in possibilities of interest.

The suggestion that A, B, C, or D might have been taken as the standard opens the way to the determination of values on the basis of a standard, that automatically and insensibly averages the relative changes of the various important commodities, thus affording a trustworthy basis for a stable scale of values. This is the multiple standard.

Take A, B, C, D as types of important commodities. At the beginning of our inquiry, we will suppose them equally important, and for the sake of simplicity we will suppose the output of each commodity for a given period 1000 units. The standard of value shall be a complex containing $\frac{1}{4}$ of a unit of

each. Call this composite, or multiple, unit M. Then 1000 A=1000 M. B, C, D each has the same value, so that the total product of A, B, C, D, for the given period, equals in value 4000 M. Suppose now that the output of A, by reason of increased efficiency or industry, rises to 3000 units for the given period, what must be the result as to the aggregate value of the four commodities? The standard of value is the multiple unit, containing $\frac{1}{4}$ of a unit of each commodity. Evidently, 1000 units of each commodity, as before, will furnish 4000 units of the standard. Hence the value of these 4000 units, 1000 of each commodity, is 4000 M. There is a surplus of 2000 A. This surplus must have a value, the measure of which, of course, depends on the relative change between A and the remaining commodities. If A declines in relative value in the same ratio as its increase in product, the 2000 A surplus is equal in value to $\frac{1}{3}$ of 2000 of either B, C, or D. But a decline to $\frac{1}{3}$ the value of B, C, or D does not express the decline as referred to the standard. However, this relation affords the basis for computing the real decline. The constituents of the standard are in relative value, $\frac{1}{3}$, 1, 1, 1, total, $\frac{4}{3}$. Dividing by 4 gives $\frac{1}{4}$ or $\frac{5}{6}$, to express the relation of the standard to three of the four constituents. $\frac{1}{3}$, 1, 1, 1, divided successively by $\frac{5}{6}$ give the new unit values of A, B, C, D. That is, the value of A is $\frac{1}{3} \div \frac{5}{6} = \frac{2}{5}$. B, C, D are each in value, $1 \div \frac{5}{6} = \frac{6}{5}$; $\frac{2}{5}$ is $\frac{1}{3}$ of $\frac{6}{5}$, which gives the correct relation between A and the remaining commodities. $\frac{2}{5}$, instead of $\frac{1}{3}$, is the real unit value of A. This value $\frac{2}{5}$, applied to the 2000 surplus product of A, gives the total excess value, 800 M. This excess value may be verified as follows:

3000 A	-	-	-	-	-	@ $\frac{2}{5}$ M=1200 M
3000 B, C, D (1000 of each)	-	-	-	-	-	@ $\frac{6}{5}$ M=3600 M
Total	-	-	-	-	-	4800 M
Value of former product	-	-	-	-	-	4000 M
Showing increase in value of	-	-	-	-	-	800 M

It will be noticed above that the total for each of B, C, D, 1200 M ($3600 \div 3$) is the same as that for A. This is as it

should be, since the ratio of increase in quantity, 3000 to 1000 for A is just offset by its ratio of decline in unit value, compared with B, C, or D, $\frac{1}{3}$.

An obvious criticism of the above exhibit is the apparent change in the value of the standard from 1 to $\frac{5}{6}$. This change is apparent only. A form of presentation could have been made that would *apparently* show an advance instead of a decline. For instance, express the relation of the new unit values of A, B, C, D by the scale 1, 3, 3, 3, instead of $\frac{1}{3}$, 1, 1, 1. $1+3+3+3=10$; $10 \div 4 = \frac{10}{4}$ or $\frac{5}{2}$. $\frac{5}{2}$ will now be the apparent value of the standard. Dividing 1, 3, 3, 3, successively by $\frac{5}{2}$ gives, as before, $\frac{2}{5}$, $\frac{6}{5}$, $\frac{6}{5}$, $\frac{6}{5}$, as the new unit values of A, B, C, D. Neither $\frac{5}{6}$ nor $\frac{5}{2}$ should be taken as the value of the standard. $\frac{5}{6}$ simply expresses the relation of the standard to the commodities B, C, D, the latter being represented by 1. Likewise, $\frac{5}{2}$ will be its relation to A, if the latter be supposed to remain constant at 1. The instructive view is to regard the value of the standard constant at 1. Then the unit values of B, C, D will show a slight increase as computed above, while the unit value of A will show a considerable decline. In this view the value of the standard is 1, and the values of A, B, C, D, respectively, are $\frac{2}{5}$, $\frac{6}{5}$, $\frac{6}{5}$, $\frac{6}{5}$. In truth, the value of the standard must remain at 1 from the very fact that it is the standard. All values must be adjusted to the scale of the standard.

We have shown that an increase of commodities involves an increase of aggregate value for the totality of commodities, on the basis of the multiple standard. This excess of value is due entirely to the excess of commodities, and the amount of this excess value depends altogether on the relative change of unit value in the commodity showing the excess of product. This does not mean that the increased product, A, standing by itself, surpasses the former product in value. In extraordinary cases, the value of a product may be entirely annihilated. In this extreme case, the aggregate value of all products shows neither decline nor increase. It does not decline, since the quantity, 1000 units of each of A, B, C, D, provides for the 4000 units, the same

number as formerly, of the standard M. It does not increase, since the surplus product 2000 A, by hypothesis has no value.

The greater the decline in value of any specific commodity that retains its utility, the better for the community as a whole, since the abundance of utilities is the *desideratum*. It will be interesting to note at what point in the decline, the maker of that product passes from a condition of advantage to one of disadvantage. We saw, in the case of a money standard, that the value of a commodity could suffer a ratio of decline greater than the ratio of increase of product, without jeopardizing the welfare of the maker. This will not hold in the case of the multiple standard. Equality of these ratios just maintains his condition, without favor or prejudice. In the example cited, when the product of A rises from 1000 to 3000, and the unit value declines to $\frac{1}{3}$, as compared with the standard, we have for the value of the total product, 3000 A @ $\frac{1}{3}$ M = 1000 M, and 1000 M contains just 250 each of A, B, C, D. This result corroborates the claim that the multiple standard correctly differentiates the values of commodities, rather than the single standard.

The relations deduced afford the basis for computing the ratio of decline in value of A to the remaining commodities, B, C, D, necessary to offset the increase in product. If A exhibits a threefold product, while that of B, C, D remains the same, we have seen that a decline to $\frac{1}{3}$ its former value, on the part of A, compared with M, the multiple standard, just maintains the aggregate value of the product. But the values of B, C, D, as compared with the standard, will advance meanwhile from 1 to $\frac{1}{9}$.¹ Hence the decline of A to $\frac{1}{3}$, compared with the standard, which is 1, is equivalent to a decline to $\frac{3}{11}$, as compared with a commodity which stands at $\frac{1}{9}$ since $\frac{3}{11}$ of $\frac{1}{9} = \frac{1}{3}$. That is, A must decline to a point much less than $\frac{1}{3}$ (nearly

¹ This result is obtained as follows: If A declines in value to $\frac{1}{3}$ M, $\frac{1}{3}$ of a unit of A contained in the standard has the value, $\frac{1}{9}$. The remaining $\frac{1}{3}$ of value must be provided by the three quarter-units of B, C, and D. If $\frac{1}{4}$ of a unit has the value, $\frac{1}{12}$, one unit has the value, $\frac{1}{3} \div \frac{1}{12}$, or $\frac{1}{9}$.

to $\frac{1}{4}$), as compared with B, C or D, before it loses its excess value. This may be verified as follows :

$$\begin{array}{rclcl} 1000 \text{ units of B, C or D} & - & - & @ \frac{1}{9} M & = 1222\frac{2}{3} M \\ 1000 A = \frac{3}{4} \text{ of } 1222\frac{2}{3} M & - & - & - & = 333\frac{1}{3} M \\ 3000 A = 333\frac{1}{3} M \times 3 & - & - & - & = 1000 M \end{array}$$

We have seen that the aggregate value of all commodities, measured in the multiple standard, must increase with an increase of product. How the value of any specific commodity will act, in relation to its increase in product, will depend on a variety of circumstances, and cannot always be predetermined. With any specific commodity we are not concerned ; but as to commodities in general, increase of product, in any instance must be accompanied by increase of value. That is to say, this must be the rule governing the movement of value, or we have an extraordinary circumstance confronting us, namely, that increase of value attends the industries that exhibit no change, or enterprise, or activity, at the expense of those which are enterprising. This condition, or predicament, follows directly from the exposition thus far. If the aggregate of commodities shows an increase of value, this increase must attach to such industries as have increased their product, or to those which have not. In the example cited, we saw that the values of A, B, C, D, each increased from 1000 to 1200 M, when the product of A rose from 1000 to 3000, and the decline of the unit value of A was to $\frac{2}{9}$ of the standard, or to $\frac{1}{3}$ that of B, C or D. That is, B, C, and D must rise in value in the ratio of $\frac{6}{5}$. If A declines so as to show no increase in aggregate value, that is, to $\frac{1}{3} M$, or $\frac{3}{11}$ of that of B, C or D, then must B, C, and D advance still more. The consequence would be that listlessness and stagnation would enjoy all the fruits of alertness and enterprise. It is needless to state that the emoluments of real life are not so distributed, ordinarily. Hence it is confidently submitted that commodities taken individually, as a rule, increase in aggregate real value with increase of product. As has been remarked, the community in general benefits from the welfare of any specific industry, but the industry itself reaps the larger share.

That is to say, in the given example, B, C, D would be likely to show a slight increase in value, while A would show a marked increase. If a unit of A, for instance, should decline to $\frac{1}{2}$, instead of to $\frac{2}{3}$, the total value of A (3000 units) would considerably exceed 1200 M, while the average increase of B, C, and D would fall below 200 M.¹

Recurring to the question of interest, it will be easy to determine the degree of productivity that will justify the employment of capital. First, what would be the effect of a decline in the product of one of the commodities? Supposing the output of A were 800 instead of 1000. Since an increase of output in the case of one commodity involves an increase of aggregate value of all commodities, it follows, as a matter of course, that a decrease of output will mark a decrease of this aggregate value. This is true, whatever be the relative appreciation of the commodity in question. Let A, for instance, rise in unit value to 97 times that of its companions, and the result may be computed as follows: $(97 + 1 + 1 + 1) \div 4 = \frac{100}{4} = 25$, the relative value of the standard. $\frac{97}{25}$, $\frac{1}{25}$, $\frac{1}{25}$, $\frac{1}{25}$ are the new values of A, B, C, D, referred to this standard, M.

800 A	-	-	-	-	-	@ $\frac{97}{25}$ M =	3104 M
3000 B, C, D, combined	-	-	-	-	-	@ $\frac{1}{25}$ M =	120 M
Total	-	-	-	-	-	-	3224 M

as against 4000 M, the value of the former product. To show that A must have its full quota, 1000, to reach the aggregate, 4000 M, it is necessary only to take the product, $\frac{97}{25} \times 1000$, or 3880 and add to 120 the result for B, C, D, and the sum is 4000 M.

What is of more significance, the appreciation of A in a greater ratio than the decrease of its product works to the great disadvantage of the remaining commodities. If A appreciates in relative value as 10 to 8, while its product declines in the

¹ If the unit value of A is $\frac{1}{2}$, supposing no relative change to one another in B, C, and D, their value would be as follows; $\frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$; $1 - \frac{1}{8} = \frac{7}{8}$; $\frac{7}{8} \div \frac{3}{4} = \frac{7}{6}$.

1000 units of B, C or D	-	-	-	@ $\frac{7}{6}$ M =	1166 $\frac{2}{3}$ M
3000 units of A	-	-	-	@ $\frac{1}{2}$ M =	1500 M

same ratio, 1000 to 800, there will fall to each share 250 each of B, C, D, and 200 of A, an equitable apportionment, although marking a decline of 50 A in the welfare of every individual. While any decline in product would thus be disadvantageous to the community as a whole, a decline accompanied by a larger ratio of appreciation on the part of one product would work, or might work, to the advantage of that commodity for a time. But consider the ultimate consequences. Suppose all industries should vie with one another to reduce the product in order to reap the advantage of undue appreciation of value. A community, collectively, for any period of time, and, individually,¹ in the long run, can profit only by an increase in output. We may then exclude the case of the temporary feasibility of interest that might attend the decline of products, and consider only the case in which the products show an increase. It will appear in the average case that interest is feasible only when the product shows an increase in excess of that amount which represents the value of the capital borrowed at the time of borrowing.

If A should borrow capital equivalent to 1000 A, and the excess of his product should fall below 1000, that is, his total product fall below 2000, so far as the community, A, B, C, D, is concerned, we should have a case of real decline of product, since 1000² of A's output would just offset borrowed capital,

¹It is true that society will carry a few industries of comparatively slight importance, whose output is regulated with a view to large returns from a restricted output; but industries in general could not pursue that policy, since there would necessarily follow a decrease of total utilities, and, consequently, of aggregate value, to be distributed.

²There might be a slight appreciation of value in this case, the effect of which would be to reduce the quota required to reimburse the capitalist below 1000, and increase the residue above 800. But the change of value, resulting from the use of borrowed capital alone, could not be so great as to raise the residue as high as 1000, since in that case the 1000 A retained by the maker would have the value of 1250 M (800 : 1000 :: 1000 : 1250), and evidently no such contingency could arise as that 1000 A produced with the aid of borrowed capital should exceed the value of 1000 A produced independently, other circumstances remaining the same. Hence the capitalist's share could not fall as low as 800, nor could the borrower's rise as high as 1000. In fact, the logic above would fix the minimum limit of the capitalist's quota and the maximum limit of that of the borrower at 900.

while the remainder falls below the product when working independently of borrowed capital. This condition, as we have seen, would exclude the feasibility of permanent interest. If, however, the product exceeds 2000, a surplus of aggregate value is the normal result. There is no guaranty of interest in any specific case, because there is no uniform law governing the change of value consequent upon change of product; but the normal law of change must allow for a surplus aggregate value from which interest may be paid.

For instance, if the product should be 2500 or 3000, and the unit value of A should be maintained, it is evident that the 500 or 1000 excess product would provide for interest. The increased product, however, is apt to be accompanied by a decreased unit value. But decrease in the unit value of A means increase in the unit values of B, C, D. This decrease of A's value, nevertheless, could not normally extend to the point where B, C, D secure the advantage over A, as that would be a premium on immobility or incompetence. If the decrease should stop short of this point, our discussion has shown that a surplus remains to A which may be applied to interest.

It may be interesting to note that in the case cited above, namely, the case of a surplus A product, the trio, B, C, D, would have a surplus which, with A's residue, exceeds the latter's borrowed capital, whatever decline in value A's product should suffer, up to the point of absolute annihilation. Let A's product be 3000, the borrowed capital being 1000 M, or what was equivalent to 1000 A at the beginning of the enterprise. Suppose a unit of A, for instance, should decrease to $\frac{1}{2\frac{1}{5}}$ its former value, or to $\frac{1}{2\frac{1}{5}}$ M, B, C, D would rise in value to $\frac{3\frac{3}{5}}{2\frac{1}{5}}$ M, since $\frac{1}{4}$ of a unit of each commodity at the prices, respectively, $\frac{1}{2\frac{1}{5}}$, $\frac{3\frac{3}{5}}{2\frac{1}{5}}$, $\frac{3\frac{3}{5}}{2\frac{1}{5}}$, $\frac{3\frac{3}{5}}{2\frac{1}{5}}$ M, added together, equals 1 M, the standard [$\frac{1}{4}$ of $(\frac{1}{2\frac{1}{5}} + \frac{3\frac{3}{5}}{2\frac{1}{5}} + \frac{3\frac{3}{5}}{2\frac{1}{5}} + \frac{3\frac{3}{5}}{2\frac{1}{5}}) = 1$]. Now, at the rate $\frac{1}{2\frac{1}{5}}$ M for A, and $\frac{3\frac{3}{5}}{2\frac{1}{5}}$ for B, C, D, the latter three commodities would exchange against A 1 for 33—that is, B, C, D could receive their quota, 750, of A, or 250 to each, for $\frac{2\frac{5}{3}}{3\frac{3}{5}}$ each of B, C, and D. This would leave a surplus to these three of 250 — $\frac{2\frac{5}{3}}{3\frac{3}{5}}$ of each commodity, B, C, D $250 - \frac{2\frac{5}{3}}{3\frac{3}{5}} \times 3 = (750 - \frac{7\frac{5}{3}}{3\frac{3}{5}}) = \text{total surplus}$.

Value of this total, $\frac{3}{2} M \times (750 - \frac{750}{3})$	-	-	= 960 M
A's residue, 2250 (3000 -- 750) @ $\frac{1}{2} M$	-	-	= 90 M
Value of $\frac{750}{3}$ of B, C, D exchanged for 750 A @ $\frac{3}{2} M$	=		30 M

The 960 M surplus to B, C, D shows how the latter benefit from A's misfortune. 960 + 90 + 30, or 1080 M, is the sum that theoretically, in this case, could be appropriated to reimburse the capitalist, including interest. The surplus to B, C, D grows with the decline of A's value, till at the point of annihilation of that value the surplus reaches the limit, 1000 M.

In our example, 3000 A represents an increased productivity of that commodity in the ratio of $\frac{3}{2}$ (adding the equivalence, 1000 A, of the borrowed capital to the exclusive labor product, 1000). We have found that A may decline in unit value through a considerable range without losing its advantage over B, C, D. At $\frac{2}{3}$, as compared with the latter, the advantage is just overcome; but all the commodities at this point will show equal advances in aggregate value, enabling A still to pay interest. At the point where A's decline is to $\frac{2}{3}$ of the standard, which is equivalent to $\frac{3}{2}$ the value of B, C or D, A will just be enabled to restore the capital borrowed, and retain his own former product. But B, C, D's products will at the same time advance in the ratio $\frac{1}{3}$, which would enable the community, as a whole, without prejudice to their welfare, still to pay interest on A's borrowed capital. This condition of affairs will continue until the decline of A's unit value reaches the ratio $\frac{1}{3}$,¹ compared

¹ This rate, $\frac{1}{3}$, indicating the limit of decline in the value of A, compatible with interest resources, may be obtained algebraically, as follows:

Let x = the required ratio.

Then $\frac{x}{4}$ = the value of the quarter-unit of A in the standard, M.

$(1 - \frac{x}{4})$ = the value of the three quarter-units of B, C, D in the standard, M.

$(1 - \frac{x}{4}) \div \frac{3}{4}$ = the value of one unit of B, C, or D = $(\frac{4}{3} - \frac{x}{3})$.

$(\frac{4}{3} - \frac{x}{3}) \times 3000$ (the B, C, D product) = $(4000 - 1000x)$.

$x \times 3000$ (the A product) = $3000x$.

By hypothesis, the entire product, whose value is the sum of $(4000 - 1000x)$ and $3000x$, just discharges the debt of 1000 M, borrowed capital, while leaving the former product-value, 4000 M, intact. Hence the equation, $4000 - 1000x + 3000x = 5000$, which yields $x = \frac{1}{3}$.

with the standard, which is equivalent to $\frac{3}{7}$, compared with B, C or D. If the value should fall below $\frac{1}{2}$, the community as a whole is prejudiced by the use of the borrowed capital.¹ These deductions are based on the following computations:

A, at $\frac{2}{3}$ of B, C or D, when referred to the standard M, reduces to the relation, A, $\frac{8}{11}$; B, C, D, each, $\frac{12}{11}$. This relation satisfies the two conditions that A shall equal, in unit value, $\frac{2}{3}$ of B, C or D, and that one unit of each commodity shall together equal 4 M. $\frac{8}{11} = \frac{2}{3}$ of $\frac{12}{11}$ and $\frac{8}{11} + \frac{12}{11} + \frac{12}{11} + \frac{12}{11} = \frac{44}{11} = 4$.

3000 B, C, D	-	-	-	-	@ $\frac{12}{11}$ M	= 3272 $\frac{8}{11}$ M
3000 A	-	-	-	-	@ $\frac{8}{11}$ M	= 2181 $\frac{9}{11}$ M
Total	-	-	-	-	-	5454 $\frac{6}{11}$ M
Deduct borrowed capital	-	-	-	-	-	1000 M
Balance	-	-	-	-	-	4454 $\frac{6}{11}$ M

This shows a surplus to the community of 454 $\frac{6}{11}$ M. Deducting 1000 M for restored capital shows A's surplus to be 181 $\frac{9}{11}$ M. He is in a position to divide this surplus with the capitalist, in discharge of interest, and still show the same surplus as his companions, since $\frac{1}{2}$ of 181 $\frac{9}{11} = 90 \frac{10}{11} = \frac{1}{3}$ of 272 $\frac{8}{11}$, the aggregate surplus of B, C, D.

For A = $\frac{2}{3}$ the standard, or $\frac{3}{5}$ of B, C or D, we have the following result:

3000 B, C, D	-	-	-	-	@ $\frac{10}{9}$ M	= 3333 $\frac{1}{3}$ M
3000 A	-	-	-	-	@ $\frac{3}{4}$ M	= 2000 M

These figures show that A could just refund the capital, while B, C, D would be in a position to pay the interest for A and still maintain an advantage.

¹ It is only on the supposition of accumulated goods, extravagantly depreciating during the process of production, that we can find the conditions for a decline in aggregate value. In the case of the text, if we consider the last supposition, the capital, 1000 M, becomes transformed, economically speaking, into 1000 A and thus suffers with the entire product of A extravagant depreciation. Such circumstances could obtain in real life, as a rarity, perhaps, but cannot be taken into account in formulating general principles.

Even in this fanciful case, the community, A, B, C, D, could have thrown the burden on the capitalist by stipulating in the beginning that the loan should be negotiated in terms of A, and returnable in that commodity. This would have left the community a surplus, which would have carried an excess value as long as A retained any value whatever.

Lastly we may make the computation based on the relation, $A = \frac{1}{2} M$, or $\frac{3}{4}$ of B, C or D:

3000 B, C, D	-	-	-	-	-	-	@ $\frac{7}{6} M$	= 3500 M
3000 A	-	-	-	-	-	-	@ $\frac{1}{2} M$	= 1500 M
								<hr/>
Total	-	-	-	-	-	-	-	5000 M
Deduct capital	-	-	-	-	-	-	-	1000 M
								<hr/>
Balance	-	-	-	-	-	-	-	4000 M

The course that A should pursue, under these circumstances, is plain. When the decline in unit value reaches a certain point, self-interest will suggest the restriction of his output, or, better still, the diverting of a part of his energies into more promising channels. If B, C, D should exercise like wisdom, their co-operation in extending production in all lines would obviate the unpleasant embarrassments that inevitably attend a decrease of utilities, and would greatly advance the general welfare of the community.

II.

The foregoing discussion is intended to show that value, aggregate real value, follows the quantitative movement of economic utilities, and is not the basic consideration in the problem of interest. This result may be reached from various points of view. Let us consider for a moment the question of interest without reference to the category of value. To do this it will merely be necessary to suppose every member of the community that produces the utilities that he himself consumes. If A, B, C, D be types of these utilities, a representative producer makes his own A, B, C, D, and there is no occasion for exchange, and, of course, no need for a mechanism to perform that office. Suppose, under these circumstances, an enterprising capitalist appears on the scene. He goes over the situation, and proposes to these simple craftsmen to provide machines for them that will double their output, he to take, as remuneration, one half of the excess. The arrangement is effected. The capitalist finds that he has made a good investment, realizing all his expense with a handsome bonus. The community has paid capital and interest out

of the surplus product. The notion of value has not occurred to the members, at least, in any very definite way. They have effected no exchange, other than the exchange of consumption goods for the *use* of machines. From long habit, their circumstances are intelligible to them only in terms of utilities—the quantity of these. The inspiration to institute a system of measurement between their products and this radically dissimilar species of property belonging to the capitalist would hardly seize them in the earlier stages of their new experience. The machines have merely been entrusted to their care and use. The question of reimbursement has been one of division of their surplus product. Interest has been paid by them in the natural, simple way, out of the source and essence of all economic reward, utilities.¹

III.

Supposing, in our illustration, a member of the community, A, B, C, D, possessing ingenuity, invents methods to increase the quantity of his product without working in the long run more hours than formerly. He is unquestionably better off than before, although the notion of value may be excluded from his thoughts or life, since exchange is not a part of either. He will consider himself well compensated for devoting a portion of his time to inventing new processes. Since exchange is not the order of the day, this citizen may be sufficiently philanthropic to share his discoveries with his neighbors, or the latter may be equally ingenious, and accordingly increase their product likewise. This is not the method of real life, but the object aimed at, namely, the increase of utilities, does not change with any alteration of the industrial mechanism. It is likely to be the case that the

¹ It will, of course, be claimed that the enterprising capitalist would push his advantage to the point of exacting nearly or quite the whole of the excess product for the use of the machines, and that the community would intuitively appraise the machines according to their efficiency, ignoring (in case they were aware of) the comparatively slight cost to the capitalist. No doubt time would bring about a certain measure of enlightenment, and in case of a single capitalist, the valuation would stand as just stated. The monopoly value would be at par with the efficiency. This point will be discussed presently in the text.

inventor will find his pleasure and profit in devoting himself to his inventions, and that the rest of the community will be more than satisfied to share their utilities with him, if he can furnish devices whereby all concerned will have increased quotas. In this case of simple barter, barter of utilities for implements or machines, we have a true case of valuation, valuation of consumption goods in terms of machines or *vice versa*. If we suppose it to be a primitive pioneer case, however, there is no danger that the category of value will so exclusively intrude itself on the attention of these simple traders, and so distort their vision as to blind them to the real significance of the transaction, namely the increased quantity of utilities. Value has as yet scarcely taken on perceptible form. If regarded at all, it is regarded only as an incident and, by no means, the end and consummation of this simple readjustment of industrial life.

Now, if we follow the interrelations of value and utilities, as manifested in the most highly developed mechanism of modern life, we must find the situation the same. We *must* find it the same, because the time never comes when consumption goods, or utilities cease to be the ultimate end of economic activity. Value, or valuation, comes to be more and more prominent and at last indispensable, simply because exchange involves valuation, and division of labor and segregation of industries necessitate exchange. But neither valuation, nor exchange, nor division of labor is an end to itself. The end of each and all collectively is increase of utilities. It is always for the sake of increased utilities that division of labor is resorted to, that exchange is resorted to, that valuation becomes the efficient and prominent expedient for the distribution of utilities, but only the expedient.

It therefore appears that increase of commodities, or utilities, involves normally increase of total value—that is, of real value, value according to the multiple standard. Indeed, conventional or money value, to be satisfactory, must not greatly offend this criterion. For transactions that do not involve time it would work no special injustice, although there might be great

inconvenience, for values to change haphazard ; but for transactions involving time, it is very important that the unit values of one period conform closely to those of another. When change of value can be forecast, the change can be allowed for in the negotiation. Irving Fisher¹ has shown how interest moves up and down with the depreciation and appreciation of the standard. This phenomenon could not happen if money value were the ultimate consideration in exchange. It is an emphatic confirmation of the view that utilities are the fundamental determining factor. Indeed, public morals demand that money value, based on an arbitrary standard, keep closely in touch with the movements of utilities. If the standard changes rapidly and independently, deferred payments are attended with great injustice, as, witness the experience with inconvertible paper. And even in case of money of intrinsic value, the course of silver in late years shows the necessity of actually discarding a standard when its movements defy control or fore-casting.

IV.

If in our simple community, A, B, C, D, a single member makes the machines, it will be interesting to enquire the rate of exchange between machines and finished products. Let us suppose that to construct and keep in order one machine, or one set of machines, requires one fourth of the maker's time, so that the productivity of the machine must make up for this one fourth in a specific period, say the life of the machine. Let us suppose that in this three fourth's time, that the machine is in operation, its productivity makes up not only the one fourth but another one fourth in addition. And for the machine to furnish a profitable process there must be some additional productivity. Then since, by hypothesis, the machine has worked but three fourths time, the actual productivity of the machine is two thirds in excess of that of hand work, so that a purchaser using the machine full time realizes a product $66\frac{2}{3}$ per cent. greater than formerly. Böhm-Bawerk's claim that the machine has the value of the

¹"Appreciation and Interest." *Publications of the American Economic Association*, vol. xi.

excess product may be tested in this simple case. If there is but one maker of machines, and but one capable of making them, it is plain that he can command anywhere up to this two thirds product of hand work. The machine has cost him in time what is equivalent to one third of his own hand product, so that the limit of his natural gain is 100 per cent. It will fall some below this point, since the purchaser will rarely invest excepting under the stimulus of some prospective advantage. But it must be conceded that, in this case, the value of the machine has as its limit the excess value of the product. But this case supposes a strict monopoly. Supposing that all the members are capable of making machines, but that from choice the making of them is left to a few, or suppose that there is unrestricted competition in the making of machines. It is equally plain in this case that the value of the machine will approach the one third point instead of the two thirds point, that is, toward the point which represents the expenses of production. We can concede with Böhm-Bawerk that the product (value of the product, if you choose) determines the value of the machine, but only on the first supposition, namely, in the case of a strict monopoly. In the case of competition this doctrine of Böhm-Bawerk must be discarded. If a machine is sufficiently productive to increase the product above what could have been realized by the quantity of labor required to make the machine, it is a profitable investment, and in the average case will produce an excess value in the product above the value of itself, in case of free competition. The normal value of a machine, then, will range from the "expenses of production" as its lower limit, to the excess value of the product, as its upper limit. In the case of competition the quantity of product included between these points affords the basis of interest. It is plain that these circumstances obtain in the simple case cited, and, in the complicated relations of modern life, the same conditions persist.

V.

Probably the circumstance that gives color to the view that the surplus product controls and determines the value of the

capital is that in individual and sporadic instances, there is a great decrease of unit value following a sudden or considerable increase of the product. This is true of individual cases, but it is fallacious to infer that it is true as a rule. It cannot be true as a rule. For instance, supposing A, B, C, D expand their product to fourfold, through the use of capital. Supposing the capital employed in each case is 1000 M, and that the unit values of A and B drop one half. The values¹ of C and D must at the same time advance, on the average, one half, for

Two units of A and B @ $\frac{1}{2}$ M = 1 M

Two units of C and D @ $1\frac{1}{2}$ M = 3 M

making four units = 4 M. That is to say there can be no decline without a corresponding advance. The average remains the same. If certain articles decline in unit value, from whatever cause, other articles will necessarily advance, making the average total value of a commodity increase or decrease with a corresponding movement of the product.

On the average, then, increased product of a commodity must yield increased aggregate value. This is the law of the average, and interest is a question of average. Individual borrowers must pay interest whether their investments are profitable or unprofitable. The average case, owing to the average productivity of capital, has been, as a matter of fact, profitable, which has furnished, not the pretext merely, but the justification of interest.

VI.

If a man produces a certain product by his own labor, it is certainly competent for him to equate the values of the labor and the product. This is a subjective valuation, simple and correct. His labor is his own, his product is his own; the one produced the other. There is no way for him to value his labor but in terms of the product, or its value. If this same man makes a machine that enables him to double his product, this excess product is likewise his valuation of his machine. His unassisted

¹ See p. 62.

labor has given him a single product; his machine[†] has enabled him to double the product. There is no more natural or just mental process than to assign the entire value of the product to the two factors, and in the proportion as indicated by the above analysis. It is a case of pure subjective valuation.

Now let the man go out into the market and hire labor. He pays the market price. The value of the labor is fixed. It is true that the prospective product may indirectly influence the price of the labor. It is fair to assume that the prospective product will have some quantitative relation to similar products of the past. But, at best, this is but one among a number of determining forces. If labor is abundant, competition will depress its price, despite the enhanced value of the product, and *vice versa*. Now, if the value of the hired laborer's product is twice his wages, the difference is pure gain. The great value of the product does not correspondingly enhance the value of the labor. Had the employer been unfortunate, obliged to sell the product for half the wages, this circumstance would not have depressed the latter. Of course, it is the average case with which we are concerned; and the average case must yield a surplus, or there would be no inducement to hire.

The case is the same with capital. If a man purchases a machine, and thereby realizes twice the cost of the machine, or 25 per cent. in excess of that cost, this circumstance does not determine the price of his purchase. It may, as in the case of labor, be one of a group of factors that determine that price, but the excess value of the product is gain from which interest can be appropriated, in case the capital is borrowed. The point is that here the analogy between labor and capital is perfect. The objective value in each case is determined in the market—both the value of labor and that of labor's assistant, the machine. The product determines the value in the one case no more than in the other.

VII.

What rôle does value play in the interest problem? In relation to the agencies which we have been considering, labor,

[†] The time for making the machine is not considered here.

capital, production, exchange, interest, etc., value is an effect and not a cause. We have seen that the industrial processes could go on without requiring the formality of valuation or indeed the conception of value. However the great impetus to industry which division of labor and exchange lend, by means of the facility with which the various processes are carried on, exalts value to an important and conspicuous rank in the hierarchy of economic concepts. But, after all, value, in our problem, has only vicarious or representative importance. Back of value we find the thing of real importance, the utility which value interprets and represents. Interest can be a question of conventional value, only when the latter gives a true interpretation, just as the register of the thermometer can be a true index of heat phenomena, only in case the registration is true. If the registration is false, it gives a false reading of the phenomena it professes to interpret. The water does not boil in obedience to the registration. Rather must the registration be adjusted to a correct interpretation of the phenomena. It is even so with value. The registration must be adjusted to the phenomena of economic life, in the field of distribution, and not *vice versa*.

Value is merely a relation. It arises in modern life out of the process of partition of utilities, or commodities, into the various shares of wages, profits, interest, etc. These shares have real serviceable content, and may exist actually, and always do exist logically, prior to the concept, value, which merely co-ordinates and interprets them quantitatively. Value, being a relation, cannot create so important an entity as interest, which is indeed one of the substantial categories related. A formula, or category of relation, cannot create the things related. Value is not *the*, or *a*, cause of the shares of the product. It serves, in the realm of distribution, as the language, or the quantitative interpreter, of these shares, rather than the active agent to produce them. Value is the mirror through which is seen the quantitative relation of the shares, rather than the creator of any share. If, by reason of a grave fault in the standard, the conventional value

speaks a seriously imperfect language, or shows a badly distorted image, a drastic remedy must be applied—a change of the standard. The rôle that value plays in the problem of interest is not fundamental, though important. It is conspicuous, but not essential. It is interpretative, but not creative.

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